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K. U. Grossmann, D. Homann and J. Schulz: Lower thermospheric infra-red emissions from minor species during high-latitude twilight—A. Experimental results 1885

A. J. Ratkowski, R. H. Picard, J. R. Winick, K. U. Grossmann, D. Homann, J. C. Ulwick and A. J. Paboojian: Lower-thermospheric infra-red emissions from minor species during high-latitude twilight—B. Analysis of 15 μm emission and comparison with non-LTE models 1899

B. H. Subbaraya, A. Jayaraman, S. Lal, S. Venkatramani, T. John, K. S. Zalpuri, C. R. Sreedharan, S. K. Srivastava, S. P. Perov, G. A. Kokin, S. V. Tishin, S. A. Vyazankin, O. V. Shtirkov, A. F. Chizhov, V. M. Ignatov and V. N. Uvarov: Variability in the vertical distribution of ozone measured over Thumba during the 1990 DYANA campaign 1915

A. K. Knyazev, Z. Ts. Rapoport, V. M. Sinelnikov and M. Friedrich: Rocket electron density profiles over Volgograd, Heiss Island and Esrange during the DYANA campaign 1923

H. Ranta, A. Ranta, P. Stauning, Z. Ts. Rapoport, V. M. Sinelnikov, S. Kirkwood, J. Laštovička and A. K. Knyazev: Morphology of the *D*- and *E*-regions at high latitudes in the northern hemisphere during the DYANA campaign in 1990 1933

J. Laštovička, L. F. Alberca, E. A. Benediktov, J. Boška, J. Bremer, G. Entzian, V. Fišer, J.-C. Jodogne, A. K. Knyazev, F. Marcz, B. A. de la Morena, Pl. Mukhtarov, T. Ogawa, D. Pancheva, H. Ranta, Z. Ts. Rapoport and Xiong Nianlu: Lower ionosphere at middle latitudes: its morphology and response to meteorological and solar–terrestrial activity during the DYANA campaign 1990 1947

D. Pancheva, A. Anufriev and J. Laštovička: Planetary wave activity in the lower ionosphere during the DYANA campaign 1963

F.-J. Lübken, W. Hillert, G. Lehmacher, U. von Zahn, M. Bittner, D. Offermann, F. J. Schmidlin, A. Hauchecorne, M. Mourier and P. Czechowsky: Intercomparison of density and temperature profiles obtained by lidar, ionization gauges, falling spheres, datasondes and radiosondes during the DYANA campaign 1969

N. Gonzalez, A. Hauchecorne, S. Kirkwood, F.-J. Lübken, A. H. Manson, A. Mourier, F. J. Schmidlin, R. Schminder, D. Kürschner, W. Singer and H.-U. Widdel: Intercomparisons of simultaneous remote and *in situ* wind measurements 1985

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